MEMORANDUM

DATE: July 1, 2003

SUBJECT: Request for a Removal Action at the Calcasieu Estuary Site, Bayou Verdine Area of Concern, Lake Charles, Calcasieu Parish, Louisiana

FROM: John Meyer, Remedial Project Manager
Project Management Section (6SF-LP)

TO: Myron O. Knudson, P.E., Director
Superfund Division (6SF)

THRU: Wren Stenger, Chief
Louisiana/New Mexico Branch (6SF-L)

I. PURPOSE

This memorandum requests approval for a Removal Action pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §§9601 et seq., at the Bayou Verdine Area of Concern in the Calcasieu Estuary (Site) in Lake Charles, Louisiana. The proposed action involves the removal of contaminated sediments at the Site and upland on-site containment.

This action meets the criteria for initiating a removal action under the National Contingency Plan (NCP), 40 CFR §300.415. In accordance with 40 CFR § 300.415(a)(2), an effort has been made to determine whether or not the responsible party can and will perform the Removal Action. The Potentially Responsible Parties ("PRPs"), ConocoPhillips Company ("Conoco") and Sasol North America Inc. ("Sasol") have informally indicated to the U.S. Environmental Protection Agency (EPA) that they will perform the Removal Action. This action is expected to require less than twelve months to implement and cost more than $2 million.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS # :LAD985195346
Category of Removal: Non-time Critical/Enforcement
Site ID # KH
Latitude: 30° 14' 30" N
Longitude: 93° 17' 00" W

A. Site Description

1. Removal Site Evaluation

The "Site" or "Bayou Verdine Area of Concern" is defined as the discrete portion of the Bayou Verdine channel extending upstream 2.8 miles from its mouth and its tributaries and each of their associated surface water, sediments, soil, biota, adjoining shoreline and banks, riparian habitats and wetlands. The 2.8 mile Bayou Verdine channel was subdivided into four spatially distinct reaches extending from 0.5 miles upstream of the Conoco facility to Coon Island Loop.

Conoco and Sasol have undertaken an investigation and evaluation of Bayou Verdine in cooperation with the EPA Region 6 investigation of the Calcasieu Estuary. The Conoco/Sasol investigations are reported in the following documents:

1) Bayou Verdine Investigation: Volume I, Nature and Extent Investigation, Lake Charles, LA (NEI Report). ENTRIX Inc., October 12, 1999.

2) Bayou Verdine Investigation, Volume II: Screening Level Ecological Risk Assessment, Lake Charles, LA. ENTRIX Inc., November 3, 1999.

3) Bayou Verdine Investigation, Volume III, Baseline Ecological Risk Assessment, Lake Charles, LA (BERA). ENTRIX Inc., March 30, 2001.

4) Bayou Verdine Investigation, Volume IV, Baseline Human Health Risk Assessment, Lake Charles, LA (HHRA). ENTRIX Inc., April 12, 2001.

2. Physical Location

Bayou Verdine is a wetland bayou located within the Calcasieu Estuary southwest of the city of Westlake and slightly northwest of the city of Lake Charles in Calcasieu Parish. Bayou Verdine's headwaters originate in a predominately agricultural area immediately north and northwest of the Conoco and Sasol facilities and flow in a generally south-southeast direction, subject to tidal influences, through an industrialized area before entering Calcasieu River at Coon Island Loop (Attachment 2).

3. Site Characteristics

The Site adjoins agricultural, residential, commercial and industrial properties. The primary land use along Reaches 1, 2, and 3 of Bayou Verdine is industrial. Commercial land use is present farther west from the north end of Reach 1 and the south end of Reach 2, along Interstate 10 and Highway 90. Former residential and some current residential areas are present north of the area of industrial land use on the north side of Reach 3. Rural and some residential land use is present farther north of the bayou in Reach 4. The watershed upstream of Reach 4 includes agricultural and residential land uses.

Bayou Verdine is the recipient of discharges pursuant to National Pollutant Discharge Elimination System (NPDES) permits. These discharges have included outfalls belonging to Vista, Conoco, and PPG Industries, Inc. ("PPG"). In addition, three drainage ditches, including the Vista West Ditch, the Faubacher Ditch, and the Kansas City Southern Railroad West Ditch discharge into Bayou Verdine.

Due to its location within the watershed, this system likely receives non-point source input from agricultural lands encompassing its northern reaches, and from Faubacher ditch. Faubacher ditch serves as an urban drainage system for the city of Westlake and flows through the current Conoco property prior to its discharge directly into Bayou Verdine. Accompanying these potential non-point sources are the past and current industrial point source discharges into Bayou Verdine.

During the 1950's, the southernmost 3,500 feet of Bayou Verdine were rerouted by Olin Corporation when it built a pond over the original bayou. The former route of the Bayou south of Interstate 10 was to the east of its present course, but the confluence with Coon Island Loop was near its present mouth. The only reported dredging of Bayou Verdine in recent history was by PPG in 1992 at the North Barge Slip. Bayou Verdine is reportedly about 20 feet deep in this area.

4. Releases or Threatened Release Into the Environment of a Hazardous Substance, Pollutant or Contaminant

Conoco and Sasol collected sediment samples at various depths within Bayou Verdine and analyzed them for organic and inorganic constituents. All sediment samples collected from Bayou Verdine were analyzed for the comprehensive analytical suite, which included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), metals and inorganic constituents. One sediment sample collected from each of the 12 subreaches was randomly selected and analyzed for the expanded analyte suite that included pesticides and PCBs. For the surface sediments, there were a total of 50 analytes out of 134 analyzed that were detected in Bayou Verdine sediments above the laboratory practical quantitation limit (PQL).

Results of laboratory analyses indicated that 13 PAHs and three other SVOCs were detected above the PQLs and these accounted for roughly 26% of the compounds detected in Site surface sediments. PAHs detected were acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene,

fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, and pyrene. SVOCs detected were bis(2-chloroethyl)ether, bis(2-ethylhexyl)phthalate and phenol.

Results of laboratory analyses indicated that 12 metals were detected above the PQLs and these accounted for approximately 24% of the total number of constituents detected. These metals were arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium, and zinc.

Results of laboratory analyses indicated that 7 PCBs/pesticides were detected above the PQLs and these accounted for approximately 14% of the total number of constituents detected. These included 4-4'DDT, aldrin, alpha-BHC, Aroclor 1248, Aroclor 1254, gamma-BHC (lindane), and methoxychlor.

The detected chemicals are designated as CERCLA hazardous substances as defined at CERCLA Section 101(14), 42 U.S.C. §9601(14), and further defined at 40 CFR §302.4.

5. NPL Status

The Site is not included on the National Priorities List (NPL) and is not currently proposed for consideration.

6. Maps, Pictures and Other Graphic Representations

Attachment 1 Enforcement Addendum
Attachment 2 Site Location Map
Attachment 3 Conceptual Site Model
Attachment 4 Main Channel EqP and ERM Quotient Distribution
Attachment 5 Summary of Comparative Analysis
Attachment 6 Summary of Detailed Analysis
Attachment 7 Potential ARARs and TBCs

B. Other Actions to Date

1. Previous Actions

Sasol North America Inc. (Sasol) modified its water discharge permit to remove its primary outfall from Bayou Verdine to the Calcasieu River. With elimination of this component of flow to the bayou, there was consideration that during severe low water periods, the sediments in the West Ditch Area could become exposed. Therefore, a temporary low sill structure (TLSS) was installed across Bayou Verdine in May 2002, to control the water elevation and reduce the potential for volatile emissions from the sediments until the West Ditch Area removal action is complete. The TLSS was designed to maintain a minimum water depth of one foot over the sediments.

The structure consists of two parallel inflatable, reinforced polyvinyl chloride (PVC) tubes

bonded together and encased in a housing of similar material, with skirts extending several feet outward from the base of the housing. The TLSS structure was inflated onshore, positioned over the prepared area, and pulled across the bayou. After the TLSS was anchored down, the structure was filled with a water sand slurry mixture.

Since the installation of the TLSS, Sasol has discontinued discharge into Bayou Verdine. The water elevations in the bayou have been checked during low and high tide conditions. During low tide conditions there is a minimum pool elevation that is being maintained by the TLSS and during high tide and periods of high water the TLSS is operating as an overflow weir.

2. Current Actions

As part of the investigations for the Engineering Evaluation/Cost Analysis (EE/CA), an area in Bayou Verdine at the confluence of the West Ditch was found to contain free phase ethylene dichloride (EDC) at the interface of the sediment bed and the underlying clay. The source of the EDC is assumed to have originated upstream in the West Ditch from a historical spill or release and settled into the localized topographic low at the confluence. It was determined that this area posed an immediate threat, and an action memorandum for a time-critical removal action was signed on June 21, 2002. This removal action is currently being implemented by Conoco and Sasol and is distinct from the action proposed for the Main Channel.

C. State and Local Authorities' Roles

1. State and Local Actions to Date

No State or local actions have occurred to date within the area of interest for this action.

2. Potential for Continued State/Local Response

The Louisiana Department of Environmental Quality (LDEQ) will continue to provide support for activities conducted at the Site. At this time, EPA has not requested that LDEQ fund a portion of the response action because the PRPs are expected to perform this Removal Action under CERCLA Section106.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The conditions at the facility may present a threat and an imminent and substantial endangerment to public health or welfare or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended, 40 CFR Part 300, ("NCP"). Any or all of these factors may be present at a site yet any one of these factors may determine the appropriateness of a removal action.

1. Actual or Potential Contamination of Drinking Water Supplies or Sensitive Ecosystems 40 CFR §300.415(b)(2)(ii)

The EDC in the sediments is currently being investigated by Conoco as a source of ground water contamination as part of its facility-wide ground water investigation. This investigation is being performed under State authorities and is not included in the scope of this action.

2. High Levels of Hazardous Substances or Pollutants or Contaminants In Soils Largely At or Near the Surface, That May Migrate, 40 CFR §300.415(b)(2)(iv)

A Conceptual Site model showing the potential exposure pathways from the sediments to ecological receptors is shown in Attachment 3. Protection of the ecological receptors is the basis for action for the Main Channel. Erosion and resuspension are identified as secondary release mechanisms in this model to reflect that the sediments may not be stable, and can be resuspended. Bayou Verdine is a low energy shallow flowing water body whose sediments are subject to resuspension and redistribution under extreme conditions such as: prop wash, dredging, storm events, etc.

Sediment profiles for the bayou revealed that most constituents are located within the top several inches of the sediments with lesser quantities occurring at mid-depth and the lowest quantities in the native clay layer. The nature of the contaminants and the distribution in the bayou are consistent with the conceptual model of primary releases through spills and releases from the facilities.

3. Weather Conditions That May Cause Hazardous Substances or Pollutants or Contaminants to Migrate or Be Released; NCP §300.415(b)(2)(v)

Historically, the Site's locality has inclement weather, such as brief periods of heavy rainfall. A surge of flood waters could scour the bottom of the bayou causing the contamination to spread.

4. The Availability of Other Appropriate Federal or State Response Mechanisms to Respond to the Release, 40 CFR §300.415(b)(2)(vii)

There are no other mechanisms available to respond to this release in a timely manner so as to effectively address the imminent and substantial endangerment to human health posed by the hazardous substances located on the Site. State and local officials do not have the resources available to address the current situation. If other mechanisms become available during the conduct of this response action, the EPA will evaluate that mechanism, as appropriate.

B. Threats to the Environment

Baseline Ecological Risk Assessment

A baseline ecological risk assessment was conducted in the lower 4.5 km portion of Bayou Verdine. The goal of this assessment was to characterize potential risks to selected species from exposure to chemicals found in bayou surface water and sediment, as well as in various dietary items in the bayou. Species selected for risk characterization included sediment dwelling organisms (benthic invertebrates), birds (Great Blue Heron, Belted Kingfisher, and American Coot), and terrestrial mammals (Muskrat and Mink). Dietary items for these receptors that were collected from the bayou included Gulf Menhaden, Blue Crab, Bullfrogs, and Alligator Weed. Ecological risks to aquatic species inhabiting the water column were negligible, since no chemical was found to exceed toxicological benchmarks for this medium.

A sediment Triad analysis indicated that sediments were toxic to the amphipod Hyalella azteca in laboratory tests, particularly in sediments located in the lower one-half of the bayou (Reaches 1 & 2). Analytical chemistry data indicated that concentrations of a number of chemicals exceeded sediment quality benchmarks. A benthic survey indicated a depauperate community in Bayou Verdine compared to historical surveys that were conducted in other parts of the estuary. Integrating other lines of evidence, such as the toxicity identification evaluation (TIE) and acid volatile sulfide/simultaneous extractable metals (AVS/SEM) analyses, suggested that non-polar organic compounds and sulfide were the major contributors to toxicity and relatively low community structure characteristics. An analysis based on the equilibrium partitioning (EqP) between sediment and pore water suggested that PAHs are bioavailable, which further supported their contribution to sediment benthos toxicity.

A weight of evidence approach based on the sediment Triad is used to define the response action objectives for the Main Channel. Comparison of sediment concentrations to Effects Range-Median (ERM) benchmarks in combination with the distribution of the equilibrium partition (EqP) indices is used to target the more degraded sediments within Bayou Verdine so that the removal action will provide the greatest benefit from reduction of Site risks while minimizing disturbance of existing habitat. Attachment 4 summarizes the ERM Quotients and EqP results within Bayou Verdine. Considering these multiple lines of evidence, the response action objectives for the Bayou Verdine Area of Concern are:

> **Reach 1 –** The response action objective for Reach 1 is to implement the removal action within the upper and middle portions of the reach (beginning at the bridge approximately 800 feet upstream of Coon Island Loop and continuing upstream approximately 4,800 feet to Interstate 10). There are isolated areas of potential impaired sediment quality in the lowermost portions of Reach 1, but there is a general trend of increasing sediment quality proceeding downstream in this area. This trend is supported by the PAH concentrations; four of the five samples downstream of the bridge have ERM quotients for total PAHs of less than 0.5. The one sample that exceeds 0.5 (UCST028) is located at the confluence of Bayou Verdine and Coon Island Loop in an area of potential influences from outside of Bayou Verdine. There is predicted toxicity from PAHs in three of the samples downstream of the bridge (including UCST028) using the EqP approach. However, this predicted toxicity is not completely supported by the toxicity testing. While there was toxicity indicated in

UCST028, the other sample tested from this area produced lesser effects and inconsistencies between the two test organisms. The maximum positive benefit for Reach 1 would be affected by implementing the removal action for the sediments upstream of the bridge. Downstream of the bridge, the weight of evidence indicates that only localized sediments exhibit toxicity. These downstream sediments will be addressed through natural recovery so the habitats will not be disturbed by the removal action.

Reach 2 – Areas of impaired sediment quality are distributed throughout Reach 2 as summarized on Attachment 4. The response action objective to provide maximum benefit for Reach 2 is to implement the removal action for the reach upstream of Interstate 10 except for bayou crossings.

Reach 3 – The lowermost portion of Reach 3 will be addressed with the West Ditch Area. There are a few, small, isolated areas with potential impaired sediment quality farther upstream in Reach 3, but the weight of evidence suggests that there would be minimal risk reduction by addressing these isolated areas. The response action objective to provide maximum benefit for Reach 3 is to allow natural recovery of this reach upstream of the West Ditch Area.

Reach 4 – Attachment 4 shows that the sediment quality is not impaired in Reach 4, and therefore the removal action will not be implemented within Reach 4.

Human Health Risk Assessment

A baseline human health risk assessment was conducted in the lower 4.5 km portion of Bayou Verdine in the vicinity of Conoco's Lake Charles refinery. The human use of the bayou is currently industrial. However, the state classifies Bayou Verdine as being available for both primary and secondary contact recreation. Consequently, the assessment characterized potential risks to hypothetical human receptor populations who may engage in limited recreational activities in the study area and may hypothetically contact chemicals present in bayou surface water, sediment and biota (fish and shellfish). Hypothetical receptor populations evaluated in this human health risk assessment included: recreational swimmers; recreational waders; workers; and biota consumers. Potentially complete exposure pathways included incidental ingestion and dermal contact with surface water and sediment, as well as consumption of fish and shellfish. Both average (AVE) and reasonable maximum exposure (RME) scenarios were evaluated for each hypothetical receptor. Recreational activities in the bayou related to the scenarios evaluated have not been observed or reported in the study area.

The AVE potential cumulative carcinogenic risks for exposure to chemicals of potential concern (COPC) in sediment and surface water were all below 1x10-6 for the following receptors: recreational swimmers (Reaches 1 and 4), recreational waders (Reaches 1 and 4), and workers (Reaches 2 and 3). The RME cumulative potential carcinogenic risks for exposure to COPCs in sediment and surface water were all within the acceptable risk range of 1x10-6 and 1x10-4 for the following receptors: recreational swimmers (Reaches 1 and 4), recreational waders (Reaches 1 and

4), and workers (Reaches 2 and 3). The majority of the potential RME cumulative carcinogenic risks are attributed by dermal contact with benzo(a)pyrene (62-73%).

The potential AVE cancer risks for hypothetical recreational and subsistence fish and shellfish consumers (Reaches 1 and 4) are within the acceptable risk range of 1x10-6 and 1x10-4. The potential RME cancer risks for hypothetical recreational and subsistence fish and shellfish consumers (Reaches 1 and 4) are greater than 1x10-4. The majority of the potential RME carcinogenic risk for hypothetical recreational and subsistence biota consumers is attributed by consumption of arsenic (58%) and bis(2-ethylhexyl)phthalate (40%) in fish tissue.

The potential AVE and RME hazard indices for hypothetical exposure to COPCs in sediment and surface water for the recreational swimmers (adult and youth; Reaches 1 and 4), and workers (Reaches 2 and 3) are all below unity, indicating a low risk.

The potential AVE hazard index for adult recreational fish and shellfish consumers is less than unity and the potential RME hazard index is greater than unity. The majority of the potential RME hazard index for adult recreational biota consumers is attributed by Aroclor 1254 (80%) in fish tissue.

The potential AVE and RME hazard indices for hypothetical adult and youth subsistence fish and shellfish consumers are greater than unity. The majority of those hazard indices for hypothetical subsistence consumption of biota are attributed by Aroclor 1254 (67-80%) in fish tissue.

Due to limited access and aesthetics, Bayou Verdine is not a known recreational area. However, access to the bayou is not restricted in Reaches 1 and 4. Therefore, risks were conservatively estimated for exposure to COPCs in the study area.

Based on results of the risk characterization, it does not appear that COPCs driving potential risks for consumption of biota (fish and shellfish) are resulting from concentrations of COPCs in sediment or surface water in the study area. Since biota are mobile, they may contact additional sources outside the study area.

The chemical contributing to the majority of RME potential risks for direct contact with sediment is benzo(a)pyrene, while risks from biota consumption are primarily attributed by Aroclor 1254 in fish tissue. If remediation were undertaken to reduce risks from sediment contact, a parallel reduction in risks due to biota consumption would not be achieved.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances, contaminants, or pollutants from this Site may present an imminent and substantial endangerment to the public health, welfare, or the environment. This endangerment should be abated or mitigated in order to protect public health, welfare, and the environment by implementing the response action selected in this Action Memorandum.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

The following four alternatives evaluated in the EE/CA for the Main Channel include:

- Alternative MC-1 - Natural Recovery
- Alternative MC-2 - Dredging and Offsite Disposal
- Alternative MC-3 - Dredging and Onsite Consolidation
- Alternative MC-4 - Containment/Capping

Considering the relative performance of the alternatives against the EE/CA evaluation criteria, the recommended removal action alternative is Alternative MC-3 (Dredging and Onsite Consolidation) for the Main Channel.

1. Proposed Action Description

Alternative MC-3 – Dredging and Onsite Consolidation
Alternative MC-3 would consist of dredging the sediments into the Trousdale Road Ponds, allowing the dredged material to settle out and dewater, constructing a soil cover over the Trousdale Road Ponds, and then regrading the area consistent with the surrounding topography. The dredging would result in a very significant reduction in the mass of contaminants in the bayou. However, it is anticipated that there will be some residual contamination in the remaining sediments and this residual contamination will be addressed through natural recovery. The natural recovery processes includes biodegradation of the organics and natural deposition of new sediments within the bayou. Post-removal sampling will be conducted to measure the progress of natural recovery in the surficial sediment layer. Post-closure monitoring would also be conducted for the Trousdale Road Ponds.

2. Contribution to Remedial Performance

No further action should be required to address the identified risk in Bayou Verdine. The implementation of the proposed action is expected to be the final action.

3. Description of Alternative Technologies

Several other alternative technologies were evaluated for this removal action. The alternative technologies that were evaluated are summarized below.

Alternative MC-1 – Natural Recovery
Alternative MC-1 is natural recovery. Site risks would be reduced by natural sedimentation and degradation of organics in the Main Channel. Alternative MC-1 also includes hydrodynamic and sedimentation studies as well as sediment sampling to evaluate the effectiveness of natural recovery.

Baseline monitoring and development of a long-term monitoring plan would be conducted during the first year. Subsequent monitoring would include:

- Annual sediment sampling for site constituents to determine whether concentrations are decreasing with natural recovery.
- Annual surveying of sediment pins at specified locations to quantify the amount of deposition (if any) that is occurring.

It is assumed that the monitoring program would be conducted for a 10-year period.

Alternative MC-2 – Dredging and Offsite Disposal

Alternative MC-2 would consist of dredging the sediments and transporting them offsite for disposal at a permitted landfill as a nonhazardous material. The dredging would result in a very significant reduction in the mass of contaminants in the bayou. However, it is anticipated that there will be some residual contamination in the remaining sediments and this residual contamination will be addressed through natural recovery. The natural recovery processes include biodegradation of the organics and natural deposition of new sediments within the bayou. Post-removal sampling would be conducted to measure the progress of natural recovery in the surficial sediment layer.

Alternative MC-4 – Containment/Capping

Alternative MC-4 would consist of covering the bayou channel sediment with the AquaBlok™ composite particle system. AquaBlok™ was selected over other containment options because it can be placed with minimal disturbance to surrounding habitat and would provide a substrate suitable for the Bayou Verdine environment. Other potential cover materials would be evaluated during the design phase.

AquaBlok™ is a proprietary, composite-aggregate mixture of clay or clay-size minerals, polymers and other special additives surrounding a dense aggregate nucleus. In most cases the clay component of AquaBlok™ is largely bentonite clay; however, other clay materials (attapulgite or organoclays) or clay-sized materials can also be incorporated to meet project or site-specific requirements.

After placement in the water, the AquaBlok™ particles fall to the substrate and expand into a continuous and cohesive erosion resistant layer of low permeability. This layer forms a physical, hydraulic and chemical resistant barrier that separates the contaminated sediments from the overlying water column and the biota in the bayou.

AquaBlok™ would be placed with either a shore-based conveyer or a helicopter. It is assumed that the AquaBlok™ barrier would be between 6 and 8 inches thick. Pre-application activities would consist of bench-scale testing and application planning. Some site preparation activities would be required in areas where shore-based application would be used. Most areas to be covered have limited site access. It is estimated that approximately 80 percent of the area to be covered with AquaBlok™ would be placed by helicopter. In other areas access to the bayou

would be by clearing and construction of access roads. The disturbance to other areas would be kept to a minimum.

Considering the relative performance of the alternatives, the recommended removal action alternative is Alternative WD-2 (Dredging and Offsite Incineration/Disposal) for the West Ditch Area. This alternative provides the best balance of the evaluation criteria when compared to the other alternatives as shown in Attachment 5.

4. EE/CA

An EE/CA Approval Memorandum was signed on February 7, 2002, that outlined the threats posed at the site and provided the basis for initiating the non-time critical removal action. The EE/CA was implemented by Conoco-Phillips and Sasol under an Administrative Order on Consent signed on February 15, 2002. The draft final EE/CA was submitted to EPA on July 22, 2002.

The EPA established an Administrative Record for the EE/CA and published a notice of the availability of the EE/CA and the start of a public comment period of thirty days. At the close of the public comment period on June 20, 2003, EPA had not received any public comments.

5. Applicable or Relevant and Appropriate Requirements

This removal action will be conducted to eliminate the threat or potential threat of a hazardous substance, pollutant or contaminant pursuant to CERCLA, 42 U.S.C. § 9601 et seq., and in a manner consistent with the National Contingency Plan, 40 CFR Part 300, as required at 33 U.S.C. §1321(c)(2) and 42 U.S.C. §9605.

As per 40 CFR §300.415(J), fund-financed removal actions under CERCLA Section 104 and removal actions pursuant to CERCLA Section 106 shall, to the extent practicable considering the exigencies of the situation, attain the applicable or relevant and appropriate requirements under Federal environmental law, including, but not limited to, the Safe Drinking Water Act (SDWA), 42 U.S.C. §300f et seq., the Clean Air Act (CAA), 42 U.S.C. §7401 et seq., the Clean Water Act (CWA), 33 U.S.C. §1251 et seq., the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq., or any promulgated standard, applicable or relevant and appropriate requirements, criteria, or limitation under a State environmental or facility siting law that is more stringent than any federal standard, requirement, criteria, or limitation contained in a program approved, authorized or delegated by the Administrator and identified to the President by the State.

6. Project Schedule

The removal project will require approximately six to nine months to complete.

B. Estimated Costs

If the proposed non-time critical removal action for contaminant source control is not taken at the Site, the Site's toxic hazardous substances will migrate into the surface water column and ground water, thereby exposing humans and/or animals who are using the aquifer. Furthermore, the migration of the Site's contaminants would continue to contaminate larger volumes of sediment, thereby increasing the cost of any possible future remediation project.

VII. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues associated with the Site or the proposed clean up.

VIII. ENFORCEMENT

See Attachment 1 for the Enforcement Addendum.

IX. RECOMMENDATION

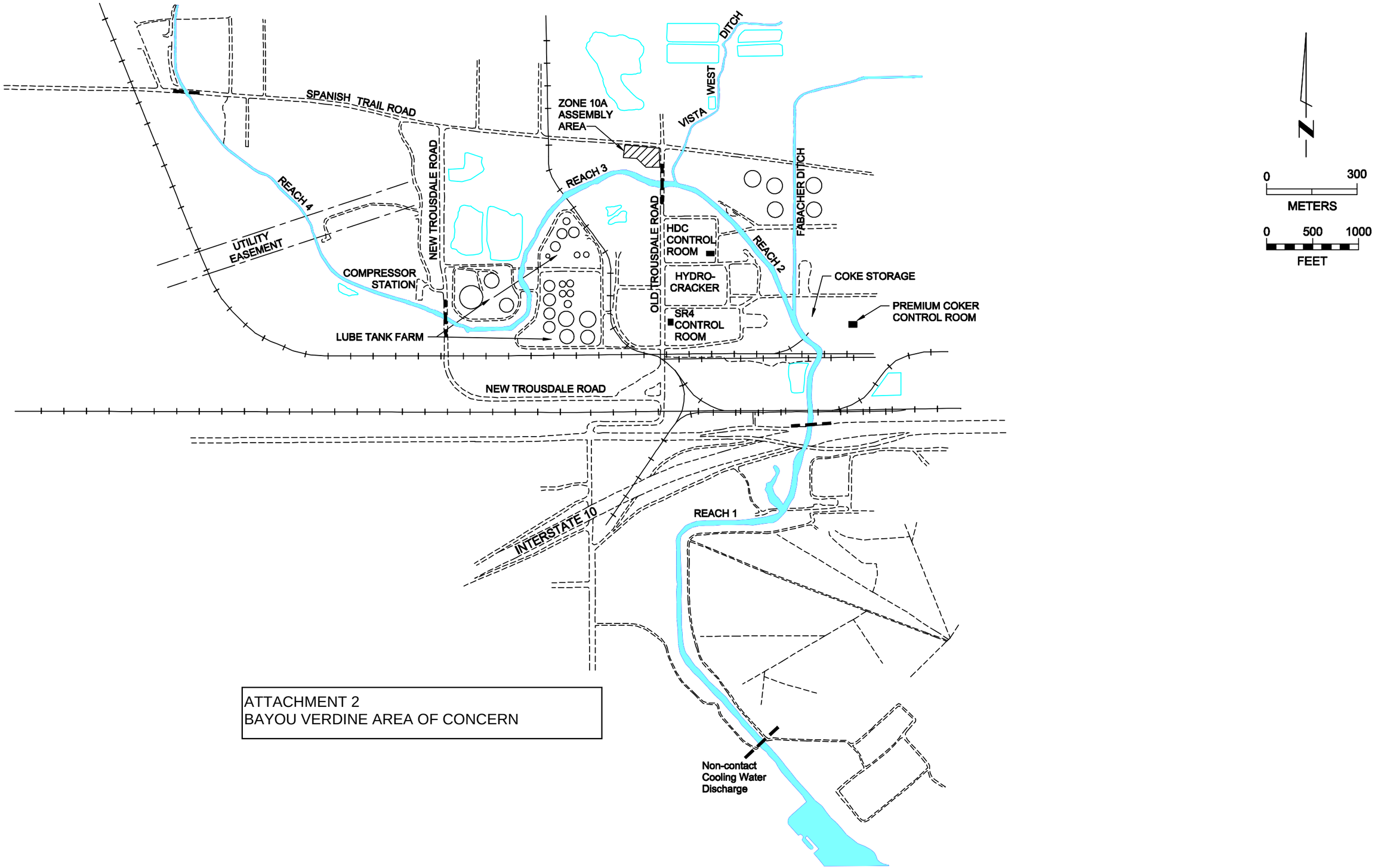
This decision document represents the selected non-time critical removal action for the Bayou Verdine Area of Concern in the Calcasieu Estuary in Lake Charles, Louisiana, developed in accordance with CERCLA, as amended, and not inconsistent with the NCP, 40 CFR Part 300. This decision is based on the administrative record for the Site.

Conditions at the Site meet the criteria as defined by 40 CFR §300.415(b)(2) of the NCP for a removal, and I recommend your approval of the proposed removal action. The PRPs are expected to pay for this action, so no funds will be required from the Regional Allowance.

APPROVED _____ DATE 8/6/03

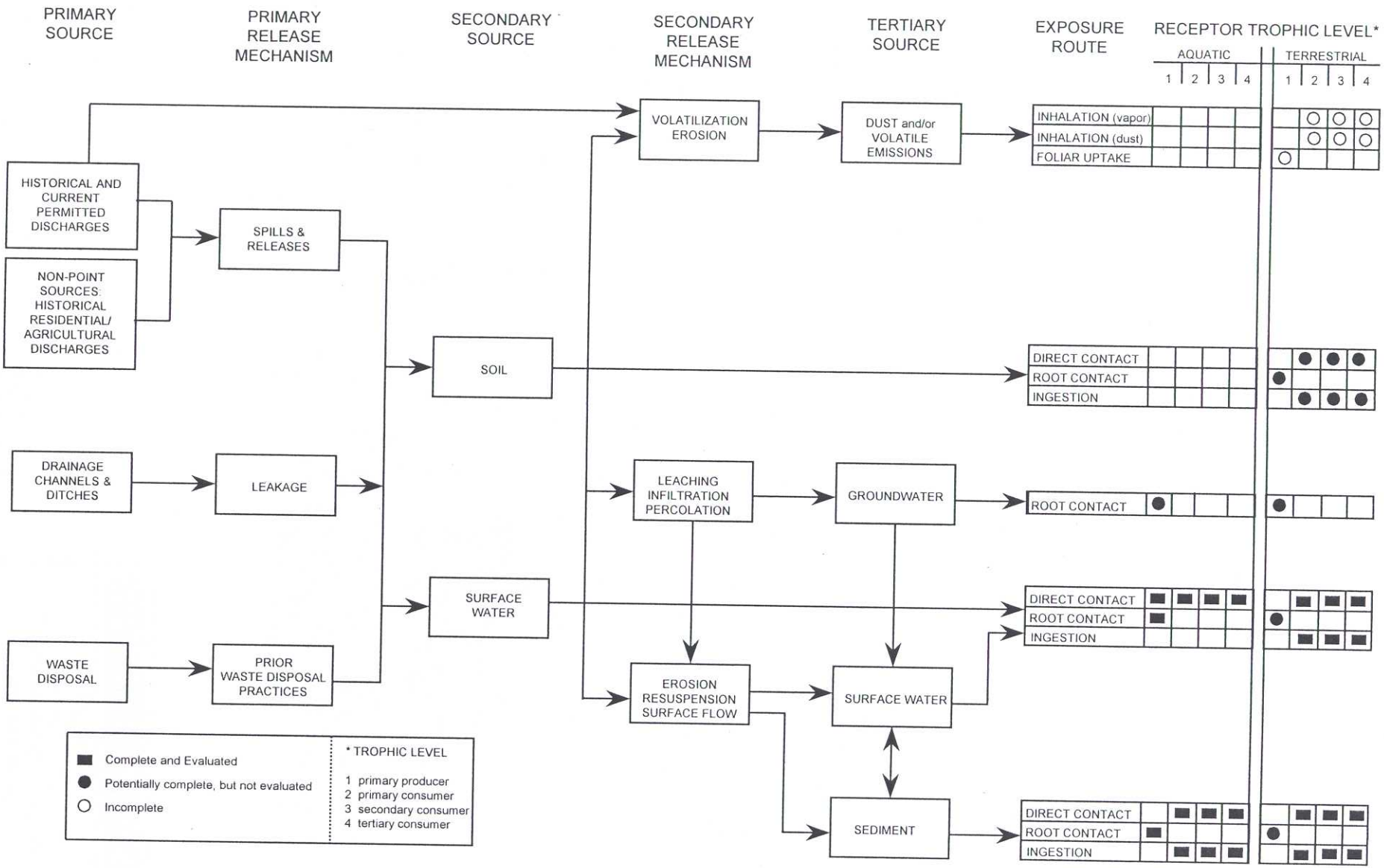
ATTACHMENT 1

Enforcement Addendum
Enforcement Sensitive -- FOIA Exempt – Not For Release



ATTACHMENT 2
BAYOU VERDINE AREA OF CONCERN

Conceptual Site Model for Bayou Verdine.



Attachment 3

Attachment 4 is too large to include

ATTACHMENT 5

SUMMARY OF COMPARATIVE ANALYSIS
MAIN CHANNEL

Criteria	Alternative MC-1 Natural Recovery	Alternative MC-2 Dredging and Offsite Disposal	Alternative MC-3 Dredging and Onsite Consolidation	Alternative MC-4 Containment/ Capping
Effectiveness (Each subcriterion has a possible 3 points for a total of 15 points for effectiveness)				
Overall Protection of Human Health and the Environment	0	3	3	2
Compliance With ARARs	3	3	3	3
Long-Term Effectiveness and Permanence	0	3	3	2
Reduction in Mobility, Toxicity or Volume	0	2	2	1
Short-Term Effectiveness	3	1	1	2
Implementability (Possible 5 points)	4	2	3	1
Cost (Possible 5 points)	5	2	3	4
Total	15	16	18	15

ATTACHMENT 6

SUMMARY OF DETAILED ANALYSIS FOR MAIN CHANNEL

Alternative	Effectiveness					Implementability	Cost Present Worth ($1,000)
	Overall Protection of Human Health and Environment	Compliance With ARARs	Long-Term Effectiveness and Permanence	Reduction of Mobility, Toxicity and Volume	Short-Term Effectiveness		
Alternative MC-1: Natural Recovery	– Risks would decrease with natural recovery of the system. – The alternative includes monitoring to evaluate the effectiveness of natural recovery.	– None of the location- and action-specific ARARs pertain to Alternative MC-1.	– Long-term effectiveness and permanence are uncertain and would be determined from monitoring.	– There would be a slow reduction in mobility, toxicity and volume as organic compounds degrade over time. – Effective toxicity (availability) would gradually decrease in the active zone.	– There would be no short-term adverse effects associated with this alternative.	– Easily implementable from a technical basis.	650

ATTACHMENT 6 (Continued)

SUMMARY OF DETAILED ANALYSIS FOR MAIN CHANNEL

Alternative	Effectiveness					Implementability	Cost
	Overall Protection of Human Health and Environment	**Compliance With ARARs**	**Long-Term Effectiveness and Permanence**	**Reduction of Mobility, Toxicity and Volume**	**Short-Term Effectiveness**		**Present Worth ($1,000)**
Alternative MC-2: Dredging and Offsite Disposal	– Would provide additional protection by targeting areas where sediment constituents have the greatest potential to impact Site risk, and removing these contaminated sediments from the bayou. – With any dredging technology there would be some resuspension and settling out of contaminated sediments, which may leave residual contamination. – Residual contamination would be addressed with	– Could be implemented to comply with location- and action-specific ARARs. – Compliance with substantive requirements of Section 404 of the Clean Water Act would be required. – Would require modification to Louisiana Discharge Permit. – Disposal facility would require approval for acceptance of CERCLA waste.	– Would result in permanent removal of contaminated sediments from the bayou by dredging. – Dredged material would be sent to a permitted landfill.	– There may be a temporary increase in mobility and availability of constituents due to resuspension during dredging. – There would be a decrease in the mobility and effective toxicity (availability) with containment and dredging/disposal – There would be a decrease of volume of contaminated sediments in the bayou.	– A Site-specific Health and Safety Plan would be required to ensure protection of remediation workers and eliminate any potential exposures to people outside of the work area. – Small potential for exposure to the community during transportation to the offsite incinerator/disposal facility due to accidental discharge resulting from a traffic accident or other similar incident, which would be minimized with proper selection, training and oversight of subcontractors. – Action would take approximately 6 to 9 months to implement.	– Moderately difficult to implement. – Shallow water and bayou crossings may impede dredging progress. Potential for underwater obstructions that could make dredging difficult. – Other logistical concerns related to access and piping sediments long distances. – Fine-grained sediments and high organic content may make dewatering difficult.	7,340

ATTACHMENT 6 (Continued)

SUMMARY OF DETAILED ANALYSIS FOR MAIN CHANNEL

Alternative	Effectiveness					Implementability	Cost Present Worth ($1,000)
	Overall Protection of Human Health and Environment	Compliance With ARARs	Long-Term Effectiveness and Permanence	Reduction of Mobility, Toxicity and Volume	Short-Term Effectiveness		
	natural recovery.						

ATTACHMENT 6 (Continued)

SUMMARY OF DETAILED ANALYSIS FOR MAIN CHANNEL

Alternative	Effectiveness					Implementability	Cost Present Worth ($1,000)
	Overall Protection of Human Health and Environment	**Compliance With ARARs**	**Long-Term Effectiveness and Permanence**	**Reduction of Mobility, Toxicity and Volume**	**Short-Term Effectiveness**		
Alternative MC-3: Dredging and Onsite Consolidation	– Would provide additional protection by targeting areas where sediment constituents have the greatest potential to impact Site risk, and removing these contaminated sediments from the bayou. – With any dredging technology there would be some resuspension and settling out of contaminated sediments, which may leave residual contamination. – Residual contamination would be addressed with natural recovery	– Could be implemented to comply with location- and action-specific ARARs. – Compliance with substantive requirements of Section 404 of the Clean Water Act would be required. – Would require modification to Louisiana Discharge Permit. – Consolidation of the material in the West Ponds is consistent with USEPA's Area of Contamination Policy.	– Would result in permanent removal of contaminated sediments from the bayou by dredging. – Dredged material would be secure in ponds.	– There may be a temporary increase in mobility and availability of constituents due to resuspension during dredging. – There would be a decrease in the mobility and effective toxicity (availability) with containment and dredging/disposal. – There would be a decrease of volume of contaminated sediments in the bayou.	– A Site-specific Health and Safety Plan would be required to ensure protection of remediation workers and eliminate any potential exposures to people outside of the work area. – Removal would take approximately 6 to 9 months to implement. Consolidation may take another 6 months before cover can be placed.	– Moderately difficult to implement. – Shallow water and bayou crossings may impede dredging progress. – Potential for underwater obstructions that could make dredging difficult. – Other logistical concerns related to access and piping sediments long distances.	5,070

ATTACHMENT 6 (Continued)

SUMMARY OF DETAILED ANALYSIS FOR MAIN CHANNEL

Alternative	Effectiveness					Implementability	Cost Present Worth ($1,000)
	Overall Protection of Human Health and Environment	Compliance With ARARs	Long-Term Effectiveness and Permanence	Reduction of Mobility, Toxicity and Volume	Short-Term Effectiveness		
	natural recovery.						
Alternative MC-4: Containment/ Capping	– Would provide additional protection by covering areas where sediment constituents have the greatest potential to impact Site risk. – There may not be complete coverage or a consistent thickness in all the areas covered by AquaBlok™.	– Could be implemented to comply with location- and action-specific ARARs. – Compliance with substantive requirements of Section 404 of the Clean Water Act would be required.	– Potential for erosion and compatibility with site conditions would have to be determined prior to placement of the AquaBlok™.	– There would be a slow reduction in inherent toxicity and overall volume from degradation of the organics. – Effective toxicity (availability) and mobility would be reduced in the covered areas.	– A Site-specific Health and Safety Plan would be required to ensure protection of remediation workers and eliminate any potential exposures to people outside of the work area. – Remedy would take approximately 4 to 6 months to implement.	– Moderately difficult to implement. – AquaBlok™, application would be by helicopter for approximately 80 percent of the covered areas. There is the potential for incomplete and inconsistent coverage. – Bench scale and/or field scale testing would be required. – Because the technology is not widely used, scheduling is a concern.	2,710

ATTACHMENT 6 (Continued)

SUMMARY OF DETAILED ANALYSIS
FOR MAIN CHANNEL

ATTACHMENT 7

POTENTIAL ARARs AND TBCs

Potential ARAR/TBC and Legal Citation	Classification	Description	Applicability
Endangered Species Act of 1973: 16 USC 1531, 50 CFR 81, 225, 402	Relevant and Appropriate	Requires federal agencies to ensure that action authorized by an agency is not likely to jeopardize the existence of any species on the endangered or threatened list or adversely affect its critical habitat.	There has not been species on the endangered or threatened list identified at the site. If any are identified in the future, remedial action would require consultation and permitting as specified by Section 7 of the act.
National Historic Preservation Act: 16 USC Section 461, 469 and 470; 40 CFR 6.301(b), 36 CFR 800	Relevant and Appropriate	Sets guidelines for remedial actions at or near historic properties included on or eligible for inclusion on the National Register of Historic Places.	Remedial actions must ensure that potential historic areas are not adversely affected. Historic places have not been identified at the site.
Archeological and Historical Preservation Act 16 USC 469a-1	Relevant and Appropriate	Provides for the preservation of historical and archeological data.	Relevant and appropriate if historical and archeological data would be affected by remedial action. There has not been any historical and archeological data identified at the site.
Fish and Wildlife Coordination Act: 16 USC 661	Relevant and Appropriate	Set standards for protection of fish and wildlife when federal actions result in control or structural modification of a natural stream or water body. This act prohibits water pollution with any substances deleterious to fish, plant life, or bird life and requires consultation with the U.S. Fish and Wildlife Service and appropriate state agencies.	Would be relevant and appropriate for remedial actions that modify Bayou Verdine.
Clean Water Act - National Pollutant Discharge Elimination System (NPDES) permit limitations: 40 CFR 132, 403.5	Relevant and Appropriate	Enforceable standards for discharge of pollutants to surface water. Standards are set to maintain water quality consistent with public health and recreation, propagation and protection of aquatic life and other beneficial uses of water.	Louisiana has been delegated water permitting authority, so Federal NPDES permit is not required. However, EPA Region 6 reviews/approves new permits and any major modifications.

ATTACHMENT 7(Continued)

POTENTIAL ARARs AND TBCs

Potential ARAR/TBC and Legal Citation	Classification	Description	Applicability
Clean Water Act - Section 404 Regulates Dredge and Fill Activities to Waters of the U.S.	Applicable	The disposition of dredged or excavated materials in waters of the U. S. is a regulated activity under Section 404.	Applicable for remedial actions involving discharge of dredged or fill material. It is likely that this work can be conducted under Nationwide Permit No. 38.
Executive Orders Related to Floodplains (11988) and Wetlands (11990) - EPA's August 6, 1985 policy on floodplain and wetlands assessments for CERCLA actions	Relevant and Appropriate	Aims to ensure that floodplains and wetlands are not adversely affected by any remedial actions undertaken at a site. No activities that adversely affect floodplains and wetlands shall be permitted if a practicable alternative is available. If no alternative is available, impacts must be mitigated.	Any dredging, excavation or filling operation, field work disturbing designated wetlands or floodplains are required to adhere to the conditions of the executive orders.
Louisiana Pollution Discharge Elimination System (LPDES) Program - LAC 33:IX Chapter 23	Applicable	Enforceable standards for discharge of pollutants to Louisiana waters.	This is applicable for the removal action alternatives that involve treatment of water in the Conoco wastewater treatment facility.
Section 10 of the Rivers and Harbors Act	Relevant and Appropriate	Dredging in navigable waters of the U. S. is regulated under Section 10 of the Rivers and Harbors Act.	Relevant and appropriate for remedial actions involving dredging. Requires authorization but probability will be addressed under Nationwide Permit No. 38.
Resource Conservation and Recovery Act (RCRA)	Applicable	Enforceable standards for management and disposal of RCRA wastes.	Applicable for remedial actions involving storage, transportation, treatment and disposal of solid wastes.
EPA Area of Contamination (AOC) Policy; 55 FR 8758-8760	To Be Considered	EPA policy that allows waste to be consolidated within an AOC without triggering land disposal restrictions or minimum technical requirements.	Policy for consolidation of material that may contain hazardous waste.
Louisiana Solid Waste Regulations LAC 33:VII	Applicable	State regulations governing the storage, transportation, treatment and disposal of solid wastes.	Applicable for remedial actions involving storage, transportation, treatment and disposal of solid wastes.

ATTACHMENT 7(Continued)

POTENTIAL ARARs AND TBCs

Potential ARAR/TBC and Legal Citation	Classification	Description	Applicability
National Institute for Occupational Safety and Health (NIOSH)	To Be Considered	Provides nonenforceable recommended exposure limits (RELs) for occupational activities for chemicals with OSHA PELs.	These are guidelines for worker exposure to air contaminants.
American Conference of Governmental Industrial Hygienists (ACGIH)	To Be Considered	Provides 8-hour time-weighted average concentrations (known as threshold limit values or TLVs) of occupational hazardous chemicals.	These are guidelines for worker exposure to air contaminants.

ATTACHMENT 8
ADMINISTRATIVE RECORD INDEX